Science Mission Directorate

Report on Precipitation Metadata and Content Standards at the International Precipitation Working Group Meeting

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Basis

- **Data systems face obstacles in their contribution to science and applications:**
  - Heterogeneous sensors, platforms, projects, and campaigns
  - Changing content, multiple formats, disparate projections, etc.
  - Multiple means of searching, discovery, packaging and delivery of data

- **Standards enable data systems <u>interoperability</u>**
  - Standards can contribute to science success and interoperability within their discipline
  - “Downstream” users have known, well documented path to use the data
  - Operational benefit for a common set of protocols for discovery and interchange
  - Engineering benefit to limiting the range of encoding (i.e., the number of different formats)

Insights

- Interoperability does not require homogeneous systems, but rather coordination at the interfaces
- Discipline communities have wherewithal and the solutions
- NASA is seeking community leadership

Background for Precipitation Standards

- **NASA's Earth Science Data Systems Standards Process Group explored the possibility of identifying disciplines where metadata or content standards could have an impact**

- **Small focus group of precipitation scientists were identified**
  - George Huffman, Phil Arkin, John Bates, John Janowiak, Chris Kummerow, Jeff McCollum, and Joe Turk

- **Initial discussion focused on**
  - Discussed feasibility of creating a content standard for precipitation data files
  - Level-2 precipitation standards considered as a reasonable goal
  - Standards must be extensible to allow for new parameters as innovations in algorithms improve the science
  - Agreed that small number of mandatory metadata and data content parameters would be useful
  - Suggested additional optional metadata and data parameters to improve the usability

Strawman Level-2 Metadata Standards

Metadata Content

- ***Orbit Segment Standard***
  - Start date and time (yyyymmdd and hhmmssss)
  - End date and time
  - Number of scans in the orbit segment
  - Platform (satellite) identifier
  - Sensor name
  - Processing algorithm and version
  - Processing date
  - Point of contact information
  - Pointer to documentation

- ***Optional Parameters – permit but not require***
  - Orbit number of low-Earth orbit data (highly recommended)
  - Number of leading scans duplicated from previous orbit segment
  - Number of trailing scans duplicated from following orbit segment
  - Calibration source data set and version number

Strawman Level-2 Data Content

Data Content

- ***Each Field of View Standard***
  - Latitude and longitude
  - Date and time
  - Surface precipitation estimate (mm/hr)
    - specify instantaneous or time averaged
  - Precipitation quality estimate
    - e.g., RMS, bias, ambiguous flag…
  - Sensor quality flag
  - Geolocation quality flag
  - Scan position index (or fractional orbit number)
  - Cell (location) number within scan

Optional Level-2 Data Content

- ***Optional Parameters***
  - Precipitation type – i.e., convective or stratiform
  - Spacecraft position, velocity, and altitude at the start of the scan
  - Surface flag (e.g., land, coast, or ocean)
  - Fractional land coverage
  - Additional precipitation variables (e.g., near-surface, vertical structure
  - Precipitation quality estimates for any additional precipitation variables
  - Additional geophysical variables –
    - e.g., total precipitable water, total precipitable ice, latent heat structure

Feedback

International Precipitation Working Group discussed the merits of precipitation content standards and concluded:

- Supported the introduction of Level-2 precipitation content standards
  - specific recommendations (e.g., blank filling for missing lines, calibration source)
  - precipitation quality estimates – but needs more rigorous definition
  - precipitation type
  - common documentation format encouraged
- Standards for Level-3 (blended precipitation over various space and time scales) is premature
- Recommended the formation of a working group under the auspices of the Global Precipitation Mission to further explore standards